

1 **Current State of the Claims**

2 No amendments have been made.

3 1. (Previously Presented) A modular system for producing a chemical product from a
4 plurality of reactants comprising:

5 (a) a control module, said control module being adapted to monitor and control
6 production of the chemical product by the modular system, said control module comprising a
7 processor, a reaction database, and a user interface, the control module being configured to enable a
8 user to interact with the user interface to select a specific reaction to produce the chemical product,
9 from a plurality of different reactions stored in the reaction database, so that in response to a selection
10 made by a user, the processor automatically controls the modular system to produce the chemical
11 product according to reaction parameters for the specific reaction that was selected, said reaction
12 parameters being stored in the reaction database;

13 (b) a reactant supply source for each of said plurality of reactants, a flow of each
14 reactant from its reactant supply source being controlled by the control module; and

15 (c) a first reaction module in fluid communication with each reactant supply
16 source to receive each of the plurality of reactants, said first reaction module being controllably
17 connected to said control module and including a reactor, said reactor automatically producing the
18 chemical product from said plurality of reactants under the control of the control module, said reactor
19 comprising a plurality of simple plates, the simple plates being configured such that aligned openings
20 in the plurality of simple plates achieve at least two reactant fluid pathways, at least one reaction
21 volume, and at least one product fluid pathway.

22 2. (Previously Presented) The modular system of Claim 1, wherein said reactor is
23 replaceable, and comprises at least one mixing volume.

24 3. (Previously Presented) The modular system of Claim 1, wherein at least one reactant
25 supply source and said first reaction module are configured to accommodate a reactant that is in a
26 gaseous state.

27 4. (Original) The modular system of Claim 1, further comprising a pump module
28 controllably connected to the control module, said pump module being in fluid communication with
29 each reactant supply source and with said first reaction module, the pump module pumping at least
30 one fluid through the modular system.

1 5. (Previously Presented) The modular system of Claim 1, further comprising an additional
2 processing module in fluid communication with said first reaction module, said additional processing
3 module being disposed downstream of said reactor, such that the chemical product produced in the
4 reactor passes through said additional processing module.

5 6. (Previously Presented) The modular system of Claim 5, wherein said additional
6 processing module comprises a residence time module in which reaction of the chemical product
7 continues toward completion for a predetermined amount of time.

8 7. (Previously Presented) The modular system of Claim 6, wherein said residence time
9 module comprises a capillary passage of a length selected to obtain the predetermined amount of time
10 for said chemical product in said residence time module.

11 8. (Original) The modular system of Claim 6, wherein said residence time module comprises
12 a proportional valve, said proportional valve being controllably connected to said control module to
13 selectively vary a pressure within said modular system.

14 9. (Previously Presented) The modular system of Claim 5, wherein said additional
15 processing module comprises a second reaction module in fluid communication with said first
16 reaction module, such that a serial fluid path is created with respect to said first reaction module, said
17 second reaction module being controllably connected to said control module and including a reactor
18 that produces the chemical product from a reaction of said plurality of reactants using a plurality of
19 synthesis steps, a first synthesis step being completed in said first reaction module, and a second
20 synthesis step being completed in said second reaction module.

21 10. (Previously Presented) The modular system of Claim 9, further comprising sufficient
22 additional processing modules, each additional processing module including a reaction module, so
23 that production of the chemical product can be achieved using additional synthesis steps that are
24 completed in succession, each additional synthesis step being completed in a different one of the
25 additional processing modules, the reaction module in each additional processing module being
26 configured to receive a product from a previous additional processing module in which an
27 immediately preceding synthesis step was completed.

28 11. (Previously Presented) The modular system of Claim 1, wherein said reactor is
29 specifically configured to enable it to produce a class of chemical products, and is selectively readily
30 removable from said first reaction module and replacable with a different reactor configured to

1 facilitate the production of a different class of chemical products, thus enabling said modular system
2 to selectively produce different classes of chemical products.

3 12. (Previously Presented) The modular system of Claim 5, wherein said first reaction
4 module further includes a housing, said housing comprising:

5 (a) a first side that includes a plurality of ports enabling said first reaction module
6 to be removably connected to said control module and in fluid communication with said each reactant
7 supply;

8 (b) a second side that includes a plurality of ports enabling said first reaction
9 module to be in fluid communication with at least one of the additional processing module and a
10 product reservoir; and

11 (c) a mounting frame for said reactor, said mounting frame being enclosed within
12 said housing, and being configured to apply a biasing force to secure said reactor in position.

13 13. (Previously Presented) The modular system of Claim 1, wherein said first reaction
14 module comprises means for facilitating production of said chemical product.

15 14. (Original) The modular system of Claim 13, wherein said means include at least one of a
16 heat exchanger, a temperature sensor, and a reactant laminar flow mixing passage.

17 15. (Previously Cancelled)

18 16. (Previously Presented) The modular system of Claim 1, wherein said modular system
19 further comprises a plurality of fluid paths, including a fluid path for each of said plurality of reactants, a
20 fluid path for said chemical product, at least one fluid path for a heat transfer media, and at least one fluid
21 path for a spent heat transfer media.

22 17. (Original) The modular system of Claim 1, wherein said at least one fluid path for said
23 heat transfer media and said at least one fluid path for said spent heat transfer media are configured in
24 one of a parallel fluidic system and a serial fluidic system.

25 18. (Original) The modular system of Claim 4, wherein said pump module comprises at least
26 one pump, said at least one pump being controllably connected to said control module to control its
27 operation.

28 19. (Original) The modular system of Claim 18, wherein said at least one pump is in fluid
29 communication with both a heat transfer media fluid supply and said first reaction module.
30

1 20. (Original) The modular system of Claim 18, wherein said at least one pump is in fluid
2 communication with both the reactant supply source for at least one of said plurality of reactants, and
3 said first reaction module.

4 21. (Original) The modular system of Claim 4, wherein said pump module comprises a separate
5 pump for each of said plurality of reactants, each separate pump being in fluid communication with the
6 reactant supply for a different one of said plurality of reactants, and with said first reaction module.

7 22. (Original) The modular system of Claim 4, wherein said pump module comprises at least
8 one valve, said at least one valve being controllably connected to said control module to control a
9 flow of one of said plurality of reactants to said first reaction module.

10 23. (Previously Presented) The modular system of Claim 4, wherein said pump module
11 comprises at least one filter that filters one of said plurality of reactants before the reactant flows to
12 said first reaction module.

13 24. (Original) The modular system of Claim 4, wherein said pump module comprises a
14 housing, said housing comprising:

15 (a) a first side that includes a plurality of ports enabling said pump module to be
16 controllably connected to said control module, and to be in fluid communication with each reactant
17 supply source; and

18 (b) a second side that includes a plurality of ports enabling said pump module to
19 be in fluid communication with said first reaction module.

20 25. (Previously Cancelled)

21 26. (Original) The modular system of Claim 4, wherein all connections between modules are
22 achieved using quick connect connectors that enable rapid connection and disconnection of the modules.

23 Claims 27 - 70 (Previously Cancelled)

24 71. (Previously Presented) A modular system for producing a chemical product from at least
25 one reactant, comprising:

26 (a) a control module, said control module being adapted to monitor and control
27 production of the chemical product by the modular system, said control module comprising a
28 processor, a reaction database, and a user interface, the control module being configured to enable a
29 user to interact with the user interface to select a specific reaction from a plurality of different
30 reactions stored in the reaction database, so that in response to a selection made by a user, the

1 processor automatically controls the modular system to produce the chemical product according to
2 reaction parameters for the specific reaction selected that was selected, said reaction parameters being
3 stored in the reaction database;

4 (b) a reactant supply source for each reactant used, a flow of each reactant used
5 from its reactant supply source being controlled by the control module; and

6 (c) a first reaction module in fluid communication with at least one reactant supply
7 source to receive said at least one reactant, said first reaction module being controllably connected to
8 said control module and including a replaceable reactor, said replaceable reactor automatically
9 producing the chemical product from said at least one reactant under the control of the control
10 module, said replaceable reactor comprising a plurality of simple plates, the simple plates being
11 configured such that aligned openings in the plurality of simple plates achieve at least two reactant
12 fluid pathways, at least one mixing volume, at least one reaction volume, and at least one product
13 fluid pathway.

14 72. (Previously Presented) The modular system of Claim 71, wherein said replaceable
15 reactor comprises a microreactor.

16 73. (Previously Presented) The modular system of Claim 72, wherein said at least one
17 reaction volume comprises a plurality of reaction volumes.

18 74. (Previously Presented) The modular system of Claim 1, wherein said reactor comprises a
19 microreactor.

20 75. (Previously Presented) A modular system for producing a chemical product from a
21 plurality of reactants comprising:

22 (a) a control module, said control module being adapted to monitor and control
23 production of the chemical product by the modular system;

24 (b) a reactant supply source for each of said plurality of reactants, a flow of each
25 reactant from its reactant supply source being controlled by the control module; and

26 (c) a first reaction module in fluid communication with each reactant supply
27 source to receive each of the plurality of reactants, said first reaction module being controllably
28 connected to said control module and including a reactor, said reactor automatically producing the
29 chemical product from said plurality of reactants under the control of the control module, said reactor
30 comprising a plurality of simple plates, the simple plates being configured such that aligned openings

1 in the plurality of simple plates achieve at least two reactant fluid pathways, at least one reaction
2 volume, and at least one product fluid pathway.

3 76. (Previously Presented) A modular system for producing a chemical product from a
4 plurality of reactants comprising:

5 (a) a control module, said control module being adapted to monitor and control
6 production of the chemical product by the modular system;

7 (b) a reactant supply source for each of said plurality of reactants, a flow of each
8 reactant from its reactant supply source being controlled by the control module; and

9 (c) a first reaction module in fluid communication with each reactant supply
10 source to receive each of the plurality of reactants, said first reaction module being controllably
11 connected to said control module and including a replaceable reactor automatically producing the
12 chemical product from said plurality of reactants under the control of the control module, said
13 replaceable reactor comprising a plurality of simple plates stacked together in layers, each simple
14 plate comprising a first planar surface, and a second planar surface that is opposite to said first planar
15 surface, both said first and said second planar surfaces being substantially parallel, each simple plate
16 further having edge surfaces extending between said first and said second planar surfaces, said
17 reactor including at least two chemical reactant inlet ports and at least one product outlet port for the
18 receipt and discharge of a chemical product, each chemical reactant inlet port and each product outlet
19 port being defined by an opening in a simple plate that penetrates the first planar surface and the
20 second planar surface of the simple plate, but not the edge surfaces of the simple plate, said reactor
21 further including at least two inlet pathways for accommodating the chemical reactants, wherein each
22 inlet pathway is connected in fluid communication with a different one of said chemical reactant inlet
23 ports, said at least two inlet pathways merging within the reactor to form at least one reaction
24 chamber in which at least two chemical reactants can react to generate a chemical product, at least
25 one outlet pathway coupling said at least one reaction chamber in fluid communication with said at
26 least one product outlet port, and wherein each chemical reactant inlet port, inlet pathway, reaction
27 chamber and product outlet port comprises an opening through at least one simple plate aligned with
28 at least a portion of an opening through an adjacent simple plate.

29 77. (Previously Presented) A modular system for producing a chemical product from a
30 plurality of reactants comprising:

1 (a) a control module, said control module being adapted to monitor and control
2 production of the chemical product by the modular system;

3 (b) a reactant supply source for each of said plurality of reactants, a flow of each
4 reactant from its reactant supply source being controlled by the control module; and

5 (c) a first reaction module in fluid communication with each reactant supply
6 source to receive each of the plurality of reactants, said first reaction module being controllably
7 connected to said control module and comprising:

8 (i) a housing;

9 (ii) a mounting frame disposed within the housing, the mounting frame
10 being configured to support a reactor; and

11 (iii) a replaceable reactor supported by the mounting frame, said replaceable
12 reactor automatically producing the chemical product from said plurality of reactants under the
13 control of the control module, said replaceable reactor comprising a plurality of simple plates, the
14 simple plates being configured such that aligned openings in the plurality of simple plates achieve at
15 least two reactant fluid pathways, at least one mixing volume, at least one reaction volume, and at
16 least one product fluid pathway.